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ABSTRACT

This newsletter presents a brief summary of central findings of a national survey designed to gather a systematic profile of the range and type of telecommunications activities being conducted by teachers for professional development or student learning. Responses were received from 550 of the 1,100 educators who were contacted through telecommunications networks and mailed questionnaires. Respondents' schools were comparable to national averages, and do not appear to represent more affluent communities than average. Over 80 percent of respondents report that they have been using computers in their teaching for five or more years. Most consider themselves intermediate or very knowledgeable about telecommunicating. They are using telecommunications for a variety of professional activities, and about two-thirds are accessing information services and carrying out collegial exchanges at least once a week. The findings suggest that telecommunications is a valuable resource for this group of teachers for professional and student learning activities, and that these educators represent a specialized group of experienced and highly educated teachers. Recommendations based on survey findings are presented. (SLD)

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News from the Center for Children and Technology and the Center for Technology in Education

Telecommunications and Teachers

ED 364 250

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Preliminary Findings from a National Survey

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Providing educators with access to basic telecommunications technology—computers, modems, and phone lines—is currently being discussed as an essential component of the educational reform agenda. Teachers can use networks to access a wealth of information ranging from reports on educational research to curriculum sources and lesson activities. The conferencing capabilities of bulletin boards and networks are a promising means for teachers to exchange ideas with colleagues. Many networks now feature discussion centers and teacher forums on a wide range of topics including school-based management, alternative assessment, and equity and education issues. Anecdotal reports have long suggested that collaborations that take place over telecommunications networks help to erase experiences of professional isolation common among teachers.

In addition, there is widespread agreement that telecommunications can enhance the range and scope of what students learn in the classroom. With the aid of creative teachers, students are using telecommunications systems to gather and exchange science information, to carry out creative writing projects, and to exchange cultural and social information. In the last five years, the use of telecommunications in the classroom has moved beyond the research and development phase and has become a wide-spread component of numerous technology integration efforts.

While there exists a wealth of descriptive information on the kinds of projects that are being carried out, there has been no systematic analysis of the range and type of telecommunications activities being conducted by teachers for either professional development or student learning. As a result, the national Center for Technology in Education conducted during 1992 a nationwide survey of K-12 educators' use of telecommunications systems for two principle purposes: professional enhancement (i.e., communicating with colleagues, downloading curriculum materials, on-line research activities) and student learning (i.e., classroom exchange projects, on-line research activities). The survey was designed to gather a systematic profile of the range of activities currently being undertaken by teachers in order to adequately advise school officials, policy makers, industry, and teachers themselves on strategies for the creative use of this technology. Based on the responses of 550 educators from 48 states, this survey represents the first systematic and large-scale profile of the benefits of and obstacles to using telecommunications effectively as a professional resource and learning tool. This newsletter presents a brief summary of some of the central findings of the survey.

80% of our respondents report that they have been using computers in their teaching for five or more years.

In 1989, the Center for Technology in Education carried out a national survey of teachers nominated as accomplished users of educational technology. According to teachers' descriptions of their practices and the amount of time they had been using technologies in their teaching, we were able to determine that it takes, on average, 5-7 years for a teacher to become a comfortable, confident user of educational technology. By the fifth year, use of drill and practice and tutorial software dropped, and teachers started expanding the number and kind of technologies they used in their classrooms. Similarly, our sample reports an average of five years of computer use, and a much lower level of use of drill and practice and tutorial software than the teachers in the "Accomplished Teachers" survey. The five years of technology use (and the kinds of applications used) that our respondents report suggest that one common path to telecommunications may be completing an "early" phase of technology use, and moving on to explore new technologies at the end of that phase.

Developing the survey and the sample

We developed the survey sample by posting on-line announcements on over fifty educational, commercial, and state-run telecommunications networks, and by soliciting through mailing lists (FrEdMail, ISTE, K-12 Net, Learning Initiatives), conferences, state education departments, and personal contacts. All of the educators who responded to the survey volunteered to participate. 50% of the educators who volunteered to be part of this study returned the 27 page questionnaire (550 of 1100).

School Profile

In order to understand how our voluntary sample is similar to and different from our nation's schools and the teachers who teach in them, we compared the demographics of our sample to national averages collected by the Center for Education Statistics. We found that across size, type of school, and ethnic and economic representation, the respondents' schools are comparable to national averages (NCES, 1992). Although there is a trend toward more suburban schools in our sample than is the case nationally, our economic data suggests that our sample does not represent more affluent communities. The sample is concentrated in the Northeast and West, and under-representative of the South and Midwest.

The schools in our sample are well-endowed with computer and distance learning technologies. The average number of computers in these schools, 66.5, is more than double the average of 26 reported in a random survey of U.S. schools (Becker, 1989). These schools also have a range of distance learning technologies available to them, including: cable television systems (75%); microwave hookups (38%); satellite (35%); and broadcast technologies (30%).

Respondent Profile

Our sample is on average older than the nation's teachers as a whole (44.9 vs. 40.2), and almost entirely Caucasian (95% - the national average is 88.1%). There are also many more men in our sample (43% of the total) than are represented in national averages (the national teaching population is 71% female, 29% male).

These educators are experienced and well-educated teachers. 83% have taught for 10 or more years (the national average is 57%). Most (79%) of our respondents have done graduate work at or beyond the Masters level; this is 32% higher than the national average.

Our respondents work with students spanning the K-12 age groups. Approximately one quarter (20%) are elementary school teachers, suggesting that educators are finding that telecommunications can support a range of activities that are meaningful for teachers who work with younger

children as well as older students. Twenty-three percent of the respondents identified their primary teaching assignment as general computer-based instruction (as distinct from computer science); and 14% percent listed their primary teaching assignment as library/media specialists (see sidebar).

The sciences (13%), including biology, chemistry, physics, earth science and geology, represented the largest content-specific discipline for these telecommunicating educators. This was followed by math and computer science (8%), other special areas (6%) (art, music, reading, health, physical education, industrial arts, business education), English/language arts (4%), social studies/social sciences (3%), gifted education (3%), special education (2%), vocational education (2%), foreign language (2%), bilingual/ESL (.4%), and basic skills (.4%). When these figures are compared to national averages compiled by the Center for Education Statistics, it becomes clear that our sample of telecommunicating educators is heavily concentrated in jobs that are directly related to using technology in instruction.

The majority (83%) of our respondents are experienced computer users, reporting that they have been using computers for five or more years (see sidebar). Almost all have access to computers at home (91%), and they are involved in a wide range of computer-based practices from word processing to robotics. They also report that they are self-taught technology users (96%), and attend conferences and workshops on their own time (72%).

A new and growing specialty in which technology and telecommunications activities are taking place is among library media specialists. We first noticed this trend when we conducted focus groups to help us design the survey instrument. According to the Bureau of School Library Media Programs, what distinguishes a library media specialist from a school librarian is that they are certified K-12 teachers. "A school library media specialist assures full integration of the library media program into the curriculum of the school through a partnership established among the library media specialist, district level personnel, administrators, teachers, and parents..." (SMLSGram, Spring 1992)

Motivation, Experience and Training

Being able to connect with other "techie" teachers really is exciting. The teachers in my building are not interested in technology, for the most part. So, using the modem connects me to a larger, more stimulating group of educators!

Most of these educators describe themselves as "intermediate" (53%) or "very knowledgeable" (30%) about telecommunicating. The majority (88%) are self taught, and have been involved in telecommunicating for professional reasons for more than four years, and using telecommunications for student activities for more than three years.

Among this group of educators, telecommunications use has been driven largely by individual motivation rather than by school or district initiatives. Seventy-eight percent of the sample reported that they were "personally intrigued by the technology" and that this is why they initially got involved with telecommunications. The survey results strongly suggest that support for telecommunications activities at the school and district level is virtually non-existent (see sidebar). In the absence of organized school-based support, a high degree of self-motivation appears to be a necessary component of undertaking telecommunication activities.

While there is support available in our respondents' schools for training in general *computer-based* activities, there is a notable absence of such support (on either a district or school level) for telecommunications. Forty-five percent of our respondents said that they learned how to use basic computer applications by taking courses offered at the district level, and 40% report taking courses offered in schools. In contrast, only 13% of the respondents report taking district-sponsored courses to learn basic telecommunications skills, and only 8% have taken telecommunications courses offered at their schools. Instead, respondents report learning about telecommunications activities mainly on their own (88%) and by attending workshops and conferences (45%).

What about the Internet?

- Slightly less than half (48%) of the respondents have access to the Internet.
- The Internet is used by twice as many of the respondents for professional activities as for student learning activities.
- Exchanging e-mail (91%), accessing news and bulletin boards (63%), and gaining remote access to other computers (48%) are the activities most frequently engaged in for professional purposes.
- Access to the Internet is supplied most frequently through a university computer (46%) or through an educational telecommunication service (37%).

Telecommunicating for Professional Development

I have been able to meet, work and learn with such a variety (geographically and background) of education professionals that it is rather like being in continuous attendance at a large international conference.

I have grown professionally by having others to collaborate with. This has helped me to be a better teacher. Having that global view keeps my classroom exciting.

The educators in our sample are actively involved in using telecommunications for a number of professional activities, including: sending e-mail to colleagues (76%), exchanging information on forums and bulletin boards (62%), accessing databases that contain information relevant to students (51%), and accessing information about educational research (49%). Approximately two-thirds are accessing information services and carrying out collegial exchanges, on average, once a week or more. The majority (69%) of these educators conduct professional telecommunications activities on their own time, from their homes, using multiple networks, both free and commercial. The most highly rated incentives for using telecommunications as a professional resource include: opportunities to communicate with other educators and share ideas; access to information that would otherwise be difficult to obtain; and combating the isolation that so many educators experience as part of their jobs.

Telecommunicating with Students

My students have learned to think more about the world as classroom —we are able to visualize the children of other nations as students, just like ourselves. I've not been able to get this idea across effectively before.

It allows me to do real science with others who choose to do real work, and allows students the chance to have a real role in global affairs while doing scientific work that matters.

Students are more actively involved, question more, contribute more, work cooperatively, initiate learning.

Penpal exchanges (41%), scientific data collection (34%), and social awareness and opinion exchanges (33%) represent the range of activities most frequently done as classroom exchange projects. When students are conducting research projects, encyclopedias (57%), news retrieval services (54%), weather information (50%), and educational databases (48%) are the resources most frequently used.

Much of the telecommunications activity done with students takes place in the educator's classroom (42%), but these respondents also telecommunicate from computer labs (33%), library media centers (32%), and their own homes (30%).

The most commonly used network services include commercial educational networks (97%) (e.g., Learning Link, AT&T Learning Circles, National Geographic Kids Network) and free educational networks (81%)

Respondents' report that one of the most important benefits of using this technology for instructional purposes is its impact on their students' higher order thinking skills. The inquiry-based analytical skills like critical thinking, data analysis, problem solving, and independent thinking develop when students use a technology that supports research, communication, and analysis. These educators report that students' involvement with telecommunications does not directly help to improve their performances on state or city mandated tests. This finding suggests that there is an enormous gap between what teachers *know* the creative use of telecommunications can do for their students, and what traditional measures of assessment *actually* account for.

(e.g., FrEdMail, FreeNet, K-12 Net).

Service offerings, expense, and ease of use are the three factors most important in determining which network services are selected.

The same factors that influence the success of any shared learning activity are important to the success of a telecommunications project: planning, cooperation, and well-defined and relevant project goals.

Educators rate science and social awareness projects as the most effective kinds of classroom exchange activities. News retrieval services, scientific databases, encyclopedias, ERIC, and social studies databases are perceived to be the most effective information resources to use with students.

The most highly rated incentives for using telecommunications activities with students include: expanding students' awareness about the world in general; accessing information that would be difficult to get otherwise; and increasing students' inquiry-based and analytical skills (see sidebar).

Barriers to Use

There should be a computer and phone on every teacher's desk.

My limited use has given me a vision of its potential, but because of hardware and budget limitations we have not yet realized that potential at the elementary level.

The barriers to effective use of telecommunications resources that were cited by our sample will sound familiar to most educators who have worked to introduce new technologies into their schools. Primary barriers described in the CTE Accomplished Teachers study in 1990 - insufficient hardware, inflexible access to equipment, lack of administrative support - are still present for teachers working with telecommunications. However, new barriers appear with the advent of telecommunications technology, the most notable being insufficient telephone lines in the school building.

Other barriers include: lack of time in the school schedule; inadequate communication about telecommunications-related matters throughout school systems; lack of financial support; and inadequate district level development of goals and plans for use of telecommunications.

Concluding Remarks

The findings of this survey suggest that for this group of educators, telecommunicating is a valuable resource for both professional and student learning activities. The findings also suggest that these educators represent a very specialized group. They are experiences and highly educated teachers. They are extremely knowledgeable about computer technology, and have been using a range of computer-based applications in their classrooms for a number of years. And, they are working in schools that are well-endowed with computer resources.

While the overall findings of this study illustrate the largely beneficial and rewarding aspects of using telecommunications technology, they also raise an important question. How can this technology be made available to educators who are less technologically sophisticated and perhaps less

"Our students are from small rural communities and very few have had the experience of traveling far from home. Last fall we were involved with the AT&T Learning network where we communicated with 9 other schools in North America. This really sparked the interest in geography, writing (penpals), and work in small groups to complete assignments."

❖

"University of Michigan Arab-Israeli Peace Conference Simulation. Have done it twice and will expand to two classes next year. Involves every student telecommunicating every day. Works because we have 25 individual computers and modems. Works because Michigan is organized and facilitates, provides feedback, solves problems."

❖

"We are involved in the International Arctic Project which is an environmental initiative focusing on the Arctic. We are following a 5-week expedition from Hudson Bay to Nueltin Lakes by four explorers on dog sled. It is the most exciting project we have ever been involved with. We are tracking the real movements of polar bears, exchanging questions and answers with the explorers, and learning about other schools."

❖

"Last year we set up a weather exchange on K-12 Net. We received weather data from all over the world. Our sixth grade class became interested in learning more about on Ojibway tribe that sent weather data from N. Canada. After several exchanges, we decided to exchange videotapes. Our student council also sent them some hockey equipment. It seemed that both groups learned a lot!"

What will foster the expansion of classroom telecommunications?

- more access to phone lines
- teacher training
- longer class periods
- alternative assessment techniques
- financial support

personally motivated to become technological enthusiasts than the individuals represented in this study? The results of our survey suggest that if the use of telecommunications technology is to become as widely based a practice as are general computer-based applications, certain supports must be put into place. The following are recommendations based on the findings from our survey.

- First, schools and districts must get involved in training teachers in the use of telecommunications. At a minimum, the same level of investment that schools and districts have made in computer-based training needs to be present for training teachers in the use of telecommunications.
- Second, respondents' ratings of barriers make it clear that there needs to be more time available in the school schedule if teachers are to effectively integrate telecommunications into their ongoing classroom activities. Research on technology integration efforts shows that typical 40-minute class periods are not adequate to projects that successfully *integrate* computer or multimedia technology into the curriculum.
- Third, in order for teachers to feel confident that student-based telecommunications projects are academically justified, assessment measures must be devised that can adequately capture and account for the kinds of critical thinking and inquiry-based analytical skills that such activities appear to foster.
- Fourth, there needs to be more financial support available in schools for telecommunications projects (e.g., network fees, telephone lines, support personnel, curriculum development). Because schools are overextended financially, this support needs to come from other sources including private corporations and foundations, as well as state and federal funding sources.
- Finally, phone lines need to become much more widely available in schools. Teachers are the only group of professionals who do not have regular access to telephones, often because the cost of installing phone lines in school buildings is prohibitive. Ideally, regional phone companies need to develop pricing structures that encourage schools to invest in this technology for their teachers. Alternatively, schools can also consider installing local area networks—a solution that reduces the need for multiple phone lines in school buildings (Newman, Bernstein, & Reese, 1992).

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National Center for Education Statistics (1992). Schools and staffing in the United States: A statistical profile, 1987-88. Washington: U.S. Department of Education, Office of Educational Research and Improvement.

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Newman, D., Bernstein, S.L., & Reese, P.A. (1992). Local infrastructures for school networking: current models and prospects. Technical Report #22, Center for Technology in Education. New York: Bank Street College of Education.

Recent Project Reports available from CCT & CTE

(TR21) **Technology-Mediated Communities for Learning: Designs and Consequences**
Jan Hawkins: October, 1991

(TR22) **Local Infrastructures for School Networking: Current Models and Prospects**
Denis Newman, Susan L. Bernstein & Paul A. Reese: June, 1992

(TR23) **Two Multimedia Design Research Projects: "Palenque" & "The Museum Visitor's Prototype"**
Kathleen Wilson: June, 1992

(TR24) **Multimedia Design Research for the Museum Education Consortium's Museum Visitor's Prototype**
Kathleen Wilson: June, 1992

(TR25) **Integrating Technology into the Curriculum: Teaching the Teachers**
Cornelia Brunner: June, 1992

Videotape **Design Experiments: Integrating Technology into Schools**
This videotape was designed to provide educators with images of the kinds of technology-based work that is being done by teachers, students and researchers at three of the schools that have been collaborative partners in CTE design experiments. The tape is divided into three sections: "Home-School Connections," about an eighth grade class in New Jersey that is using laptop computers; "Project-Based Group Work," about an alternative New York City school where students are carrying out multimedia inquiries and presentations; and "Alternative Assessment," about an engineering class at a New York City high school, where video is being used to help teachers evaluate mechanical engineering projects that are conceptualized, built, and presented by groups of students.

Videotape **Assessment and Technology**
See the "Bulletin Board" for a description of this tape. Tape and accompanying print materials are also available for purchase.

COMING SOON:

The *Bridges* Notebook: the Design and Development of a Visual Resource for Designers of Software for Culturally Diverse Audiences, by Terri Meade and Kathy Powell.

Epistemic Forms and Epistemic Games: Structures and Strategies to Guide Inquiry, by Allan Collins & William Ferguson.

Design Issues for Learning Environments, by Allan Collins

Year One of Project PULSE (Pupils Using Laptops in Science and English): A Final Report, by Katie McMillan and Margaret Honey.

To order reports:

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All reports are $3.00 per copy, and videotapes are $10.00 per copy, unless otherwise noted.

To obtain a full list of reports published by the Center for Technology in Education and the Center for Children and Technology, please write to *CCT, Bank Street College, 610 West 112 Street, New York, New York 10025.*

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Bulletin Board

❖ **ATTENTION!** Is your school involved in using the Internet? The Internet represents a vast environment that links many different computer networks throughout the world. However, Internet activity is heavily slanted towards higher education academics and technically oriented professionals. While there has been growing concern about getting the K-12 community access to the Internet and its resources, there have been no reports or studies looking at what educators do with the Internet once they are connected. As part of the work of the National Center for Technology and Education, we are interested in talking to K-12 educators who have been using the Internet. We would like to interview you about how you are making use of this resource, and discuss with you the difficulties and benefits of using the Internet. If you are willing to talk with us, please contact: Katie McMillan, *Voice*: (212) 875-4574 / *Applelink*: cte.bsc / *Internet*: kmcmillan@prime.bnkst.edu

❖ We need your help! Are you interested in getting some hands-on experience with alternative assessment? If you'd like to contribute to the development of new performance assessment techniques, this is your chance. Send us your name and address, and we'll send you a videotape that introduces you to an alternative, performance-based assessment process that is currently being used in science classes at a high school in New York City. You'll see a brief narrative about the alternative assessment system developed in this school. Then you'll watch real presentations by four groups of students from this school—you'll act as the expert evaluator, and assess the students' performances. Based on instructions we'll provide and your own experience, you'll fill out detailed scoring sheets for each presentation, and send them back to us. We hope to receive input from people all over the country, which will help us to refine scoring criteria and better understand the strengths and weaknesses of the assessment process as a whole. In return, you'll get a complimentary CCT t-shirt and our gratitude. We hope to hear from you! Contact: Dorothy Bennett, CCT, 610 W. 112th St., NY, NY 10025.

About CCT & CTE

The Center for Children and Technology (CCT) was founded at Bank Street College in 1981. Since then, the Center has undertaken a wide program of basic and applied research as well as prototype design and development. The mission of the Center is to investigate the roles technology does and can play in children's lives in general and in the classroom in particular, and the design and development of prototypical software that supports engaged, active learning.

In 1988 the Center for Children and Technology was awarded a five-year grant from the Office of Educational Research and Improvement, a part of the federal Department of Education, to serve as the national Center for Technology in Education (CTE). CTE is an interconnected set of collaborative research projects undertaken by the Center for Children and Technology in partnership with researchers at Bolt, Beranek and Newman Laboratories, Harvard University, Brown University, and the National Center on Education and the Economy.

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